

## **CLAIMS**

What is claimed is:

1. A three dimensional display device comprising:
  - a display screen having pixels and a pixel width;
  - an aperture plate disposed in front of said display screen; and
  - a gap separating said display screen and said aperture plate, said gap being within a range of 0.1cm – 5cm;wherein the three dimensional display provides multiple different perspectives viewable from multiple different user viewing angles.
2. The three dimensional display device according to claim 1, further comprising a control system connected to said display screen and said aperture plate, said control system controlling sequencing of said display screen and said aperture plate to produce three-dimensional images.
3. The three dimensional display device according to claim 1, wherein said gap comprises an air gap between said display screen and said aperture plate.
4. The three dimensional display device according to claim 1, wherein said gap comprises a solid substrate between said display screen and said aperture plate.
5. The three dimensional display device according to claim 1, wherein said aperture plate produces vertical slit apertures having a slit width.

6. The three dimensional display device according to claim 5, wherein said slit width is equal to said pixel width.

7. The three dimensional display device according to claim 5, wherein said slit width is wider than said pixel width.

8. The three dimensional display device according to claim 1, wherein said aperture plate includes a predetermined number of apertures, said predetermined number of apertures being less than a number of pixels on the display screen.

9. The three dimensional display device according to claim 1, wherein said aperture plate includes a predetermined number of apertures, said predetermined number of apertures being equal to a number of pixels on the display screen.

10. The three dimensional display device according to claim 1, wherein said display comprises a high frame rate video display device having frame rates exceeding 150 frames per second.

11. The three dimensional display device according to claim 1, wherein said display comprises a high frame rate video display device having a frame rate capable of producing at least 8 viewing angles (i.e., 8 different perspectives, each different perspective viewable from a different viewing angle).

12. The three dimensional display device according to claim 11, wherein said frame rate for producing at least 8 viewing angles comprises at least 150 frames per second.

13. The three dimensional display device according to claim 1, wherein said aperture plate comprises a high speed optical shuttering system.

14. The three dimensional display device according to claim 10, wherein said display is a direct display and is one selected from a group consisting of Liquid Crystal Display (LCD), Ferroelectric LCD (FLCD), Organic LED (OLED) and Plasma displays.

15. The three dimensional display device according to claim 10, wherein said display is a rear projection display device.

16. The three dimensional display device according to claim 15, wherein said display is one selected from a group consisting of a high speed projector and a DLP

17. The three dimensional display device according to claim 7, wherein said aperture plate comprises a solid state scan type.

18. The three dimensional display device according to claim 17, wherein said solid state scan type comprises one selected from a group consisting of flat scanners and curved scanners.

19. The three dimensional display device according to claim 1, wherein said display device comprises a Ferroelectric LCD (FLCD).

20. The three dimensional display device according to claim 1, wherein said aperture plate comprises a Ferroelectric LCD (FLCD).

21. A three dimensional display device comprising:  
a display screen having pixels and a pixel width;  
an aperture plate disposed in front of said display screen and having apertures; and  
a distance separating said display screen and said aperture plate;  
wherein the display device generates a three dimensional display exhibiting both horizontal and vertical parallax.

22. The three dimensional display device according to claim 21, wherein said apertures have a size not smaller than a size of said pixels.

23. The three dimensional display device according to claim 21, wherein said distance is within a range of 0.1cm – 5cm.

24. The three dimensional display device according to claim 21, wherein said distance separating said display screen from said aperture plate comprises an air gap.

25. The three dimensional display device according to claim 21, wherein said distance separating said display screen from said aperture plate comprises a solid substrate.

26. The three dimensional display device according to claim 21, wherein said display screen is dimensionally larger than said aperture plate.

27. The three dimensional display device according to claim 21, comprising a horizontal view angle range of at least 10 – 30 degrees from normal.

28. The three dimensional display device according to claim 21, wherein said horizontal parallax has a viewable operating range up to 180 degrees.

29. The three dimensional display device according to claim 21, wherein said vertical view angle range comprises 5 – 25 degrees from normal.

30. The three dimensional display device according to claim 21, wherein said vertical parallax has a viewable operating range up to 180 degrees.

31. The three dimensional display device according to claim 21, wherein said display comprises a high frame rate video display device.

32. The three dimensional display device according to claim 31, wherein said display has a frame rate exceeding 150 frames per second.

33. The three dimensional display device according to claim 31, wherein said display comprises a Ferroelectric LCD (FLCD) device.

34. The three dimensional display device according to claim 21, wherein said aperture plate comprises a high speed optical shuttering system.

35. The three dimensional display device according to claim 21, wherein said display device is one selected from a group consisting of LCD, Ferroelectric LCD, Organic LED (OLED) and Plasma displays.

36. The three dimensional display device according to claim 21, wherein said display is a rear projection display device.

37. The three dimensional display device according to claim 36, wherein said display is one selected from a group consisting of a high speed projector and a DLP

38. The three dimensional display device according to claim 32, wherein said aperture plate comprises a solid state type.

39. The three dimensional display device according to claim 33, wherein said solid state scan type comprises one selected from a group consisting of flat and curved scanners.

40. The three dimensional display device according to claim 34, wherein said aperture plate comprises a Ferroelectric LCD device.

41. The three dimensional display device according to claim 21, wherein a number of vertical viewing angles is less than a number of horizontal viewing angles.

42. A solid state three dimensional display device comprising:

- a display matrix;
- a substrate; and
- an LCD dynamic parallax barrier, said display matrix and said LCD dynamic parallax barrier being bonded to opposing sides of said substrate;

wherein the display device generates a three dimensional display exhibiting both horizontal and vertical parallax.

43. The three dimensional display device according to claim 42, wherein said substrate has a thickness in a range of 0.1cm – 5cm.

44. The three dimensional display device according to claim 42, wherein said LCD dynamic parallax barrier further comprises apertures and said display matrix comprises pixels, said apertures having a size not smaller than a size of said pixels.

45. The three dimensional display device according to claim 42, wherein said display matrix comprises a color FLCD device.

46. The three dimensional display device according to claim 42, wherein said LCD dynamic parallax barrier comprises a FLCD device.

47. The three dimensional display device according to claim 42, wherein said display matrix comprises a display having a frame rate exceeding 150 frames per second.

48. The three dimensional display device according to claim 47, wherein said display matrix comprises a display having a frame rate not to exceed 20,000 frames per second.

49. The three dimensional display device according to claim 42, comprising a horizontal view angle range of 20 – 60 degrees.

50. The three dimensional display device according to claim 42, wherein said horizontal parallax has a viewable operating range up to 180 degrees.

51. The three dimensional display device according to claim 42, wherein said vertical view angle range comprises 10 – 50 degrees.

52. The three dimensional display device according to claim 42, wherein said vertical parallax has a viewable operating range up to 180 degrees.

53. A method for manufacturing a solid state three dimensional device comprising:



providing a substrate of a predetermined thickness and material;  
bonding a display matrix to one side of said substrate; and  
bonding an LCD dynamic parallax barrier to said substrate opposite said display matrix;

wherein the smaller said predetermined thickness of said substrate, the wider viewing angle produced by said three dimensional device.

54. The method according to claim 53, wherein the predetermined thickness of said substrate is within a range of 0.1cm – 10 cm.

55. The method according to claim 53, wherein said substrate comprises a uniform thickness and uniform refractive index over its entire area.

56. The method according to claim 53, wherein said step of bonding is performed using a transparent bonding method that does not interfere with the refractive index of said substrate.

57. A solid state three dimensional display device comprising:  
a flat screen Ferroelectric LCD display matrix;  
a substrate; and  
a flat screen Ferroelectric LCD dynamic parallax barrier, said display matrix and said FLCD dynamic parallax barrier being bonded to opposing sides of said substrate;  
wherein the display device generates a three dimensional display exhibiting both horizontal and vertical parallax.

58. The three dimensional display device according to claim 57, wherein said substrate has a thickness in a range of 0.1cm – 5cm.

59. The three dimensional display device according to claim 57, wherein said LCD dynamic parallax barrier further comprises apertures and said display matrix comprises pixels, said apertures having a size not smaller than a size of said pixels.

60. The three dimensional display device according to claim 57, wherein said display matrix comprises a color FLCD device.

61. The three dimensional display device according to claim 57, wherein said LCD dynamic parallax barrier comprises a FLCD device.

62. The three dimensional display device according to claim 57, wherein said display matrix comprises a display having a frame rate exceeding 150 frames per second.

63. The three dimensional display device according to claim 62, wherein said display matrix comprises a display having a frame rate not to exceed 20,000 frames per second.

64. The three dimensional display device according to claim 57, comprising a horizontal view angle range of 20 – 60 degrees.

65. The three dimensional display device according to claim 57, wherein said horizontal parallax has a viewable operating range up to 180 degrees.

66. The three dimensional display device according to claim 57, wherein said vertical view angle range comprises 10 – 50 degrees.

67. The three dimensional display device according to claim 57, wherein said vertical parallax has a viewable operating range up to 180 degrees.

68. A three dimensional display device comprising:

- a flat screen display having pixels and a pixel width;
- a flat aperture plate disposed in front of said display screen; and
- a gap separating said display screen and said aperture plate, said gap being within a range of 0.1cm – 5cm;

wherein the three dimensional display provides multiple different perspectives viewable from multiple different user viewing angles.

69. The three dimensional display device according to claim 68, wherein said flat screen display and said flat aperture plate comprise a Ferroelectric LCD device.

70. The three dimensional display device according to claim 68, wherein said flat screen display and said flat aperture plate have frame rates exceeding 150 frames per second.

71. The three dimensional display device according to claim 70, wherein said display matrix comprises a display having a frame rate not to exceed 20,000 frames per second.

72. The three dimensional display device according to claim 68, comprising a horizontal view angle range of 20 – 60 degrees.

73. The three dimensional display device according to claim 68, wherein said horizontal parallax has a viewable operating range up to 180 degrees.

74. The three dimensional display device according to claim 68, wherein said vertical view angle range comprises 10 – 50 degrees.

75. The three dimensional display device according to claim 68, wherein said vertical parallax has a viewable operating range up to 180 degrees.

76. A three dimensional display device comprising:

- a hybrid screen display having pixels and a pixel width;
- a flat aperture plate disposed in front of said display screen; and
- a gap separating said display screen and said aperture plate, said gap being within a range of 0.1cm – 5cm;

wherein the three dimensional display provides multiple different viewable perspectives based on horizontal and vertical viewing angles.

77. The three dimensional display device according to claim 76, wherein said hybrid screen display comprises a high speed video projector and a display screen.

78. The three dimensional display device according to claim 76, comprising a horizontal view angle range of 20 – 60 degrees.

79. The three dimensional display device according to claim 76, wherein said horizontal parallax has a viewable operating range up to 180 degrees.

80. The three dimensional display device according to claim 76, wherein said vertical view angle range comprises 10 – 50 degrees.

81. The three dimensional display device according to claim 76, wherein said vertical parallax has a viewable operating range up to 180 degrees.